



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005GU62B

Title: Development of a Source, Transmission and Storage model of the Saipan Water System

Project Type: Research

Focus Categories: Models, Water Supply, Management and Planning

Keywords: model studies, distribution systems, water demand, water use data

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Federal Funds: \$21,745

Non-Federal Matching Funds: \$0

Congressional District:

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Abstract

Water hours and low delivery pressure have long been a part of the daily lives of the people in the islands of the Western Pacific. In Saipan, Commonwealth Northern Marianas Islands (CNMI), large investments have been made in system improvements, but delivery problems still exists. A stated goal of the CNMI government is to provide 24-hour water to all residents served by the Commonwealth Utility Corporation (CUC) water system. This goal will be unattainable until the CUC has a complete knowledge of their water delivery capabilities and operation. Over the years the CUC water distribution system has grown and new wells have been added to the system. This physical expansion has been well documented but improvements in the hydraulic characteristics and delivery capabilities of the entire system have never been fully examined. The Saipan water distribution system has been divided into 10 sub-regions. Each region is expected to operate somewhat independently. However, due to inadequate inflow to the system, system leakage, and lack of knowledge of the system behavior as a whole the system is unable to provide 24-hour water services. Recently WERI researchers have developed

computerized models of each of the ten sub-regions of the CUC water system using the Haestad WaterCad water system modeling program. This includes a physical system description, details of water usage, and parameters describing system operation. The next step needed is to examine the entire system behavior when the main distribution lines for each of the sub-systems are connected together. The benefits expected from the project include a better understanding of the adequacy of the existing pumps and well systems, the adequacy of the existing storage facilities to provide for daily fluctuating demands, the ability of the well and storage system to provide sufficient flows, and a more in depth understanding of the most efficient means to move water from water supply rich regions to those that have supply shortages in order to maintain delivery of 24 hour water to all areas in the system. The project will be split into two phases. The first phase will start from the 10-system water models previously developed of the Saipan Water System. These models will be skeltonized to remove all but the major water sources, tanks and transmission components and joined together at the boundary points. We will work closely with CUC Engineering staff to be sure all included components are correctly modeled. The model will be calibrated by comparing model predicted pressures and flows with those existing in the system. The second phase will determine the optimum system operation. This phase will be accomplished in close consultation with CUC staff engineers. First the model will be operated in steady state mode and the response of the system during critical times will be examined to determine if the system can meet the required demands and if not what changes in either operation or physical make up of the system would be required to solve the problems. Next the model would be operated in extended time simulation mode to examine storage tank operations. The response of the storage tanks during these critical times will be examined to determine if all of the tanks are operating in an optimal manner and if not what changes in either operation or physical make up of the system would be required to improve tank operations.